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I. Introduction

One of the most significant developments in commercial banking during the 1970's was the rapid growth of the multibank holding company (MHC) as an organizational form. Although bank holding companies first emerged as an important factor as a consequence of the widespread banking failures of the 1920's, which resulted in the consolidation of banking assets through mergers and acquisitions, the late 1960's saw a resurgance of MHC activity. In part, this has represented a trend in banking away from horizontal mergers in the same market, to the acquisition of existing banks in other local markets as a means of achieving growth.[1/] Another factor has been the 1970 Amendment to the Bank Holding Company Act of 1956. This legislation enabled MHC's to engage in more non-banking activities than previously. Moreover, it brought one-bank holding companies under Federal Reserve Board (Board) jurisdiction, which restricted the activities of the latter organizational form. Thus, the MHC became a more attractive vehicle for achieving banking firm growth.[2/]

The current debate over interstate banking could lead to

another phase in the evolution of the MHC movement if banks are given greater access to interstate markets by Congress or the regulatory agencies. As in the case of intrastate banking, the costs and risks of de novo entry, even if allowed by the authorities, may often be perceived to outweigh the benefits; thus, acquisition of existing banks could appear to be a more viable way for full service banking to enter new interstate local markets. In view of the possible repeal or modification of the McFadden Act (1927) and/or the "Douglas Amendment," the "public benefits" test now applied by the Board to MHC applications may be extended to interstate acquisitions.[3/]

The benefits test requires the Board to deny any MHC application if its

> effect in any section of the country may be substantially to lessen competition, or to tend to create a monopoly, or which in any other manner would be the restraint of trade, unless [the Board] finds that the anticompetitive effects of the proposed transaction are clearly outweighed in the probable effect of the transaction in meeting the convenience and needs of the community to be served.[4/]

The Board has generally taken this to mean balancing the possible concentration of banking assets at the state level against the possible procompetitive effects of an MHC acquisition in the local market.[5/] Among the potential effects of MHC acquisition on the new affiliate bank and the local market are the infusion of better and more aggressive management ability, the benefits of scale economies at the MHC level and access to greater financial resources, introduction of a wider range of local banking and non-banking services, and

other examples of improved operating efficiency and banking services. If the acquired bank was not already a dominant factor in its market, then changes in its performance would lead to an improvement in its share of the market; moreover, this would promote competitive responses by the other banks in the market. Thus, MHC entry into a local market could result in a redistribution of shares of deposits and other banking services as well as the provision of new or improved services due to the increased competitive activity. In many ways this would be similar to the effect of a de novo entry by an MHC; on the other hand, a de novo small independent bank may have a lesser effect on the market due to its relative lack of financial or managerial resources.

The purpose of this paper is to provide new empirical evidence on the effects of MHC acquisitions on the structure and, by implication, on the performance of local markets. The next section briefly surveys the literature on this subject. Section III describes the methodology, model, and data used in the study, and the empirical results are presented in Section IV. Implications of the results for both intra- and inter-state banking are drawn in the concluding section.

II. Previous Studies and Conclusions

Previous studies of the effects of MHC acquisitions at the local level have examined either the performance of the acquired banks or the structure and/or performance of the local market.[6/] The evidence to date is mixed, at best.[7/] Shull

[32], Hoffman [14], Goldberg [8], Whitehead and King [36], Rhoades [23] and [26], and Schweitzer and Greene [29], found no systematic effect of MHC activity on local market structure or performance. Studies that have reported weak evidence of procompetitive effects include those by Ware [34], Light [20], Heggestad and Rhoades [12], Talley [33], and Hooks and Martell [15] and [16]. On the other hand, recent studies by Heggestad and Rhoades [11] and Rhoades and Rutz [27] report some evidence that MHC acquisitions have had adverse effects on local market structure and performance.

Differences in methodology, time periods examined, sample size, definitions of local markets, and measures of market structure and performance make these conflicting results difficult to reconcile. Moreover, because concentration tends to change slowly over time, some studies may have been biased against finding <u>any</u> effect of MHC's on structure. Indeed, the econometric studies, including the most recent to find some evidence of adverse effects on market performance (Rhoades and Rutz [27]),have relied on cross-section estimates for one or a few years. Others have used only tabular analysis or univariate statistical analysis. It is also possible, of course, that the evidence of procompetitive effects is biased by the failure to account for other factors that may explain changes in structure and performance and/or to use sufficiently powerful statistical tests. This study attempts to rectify most of these possible shortcomings of the previous studies by using multivariate analysis of pooled data.

The use of pooled data should allow the effects of MHC activity over time to be detected despite the lack of sufficient time-series observations. It should also allow the results to be generalized because the effects of market differences are captured and excessive averaging can be avoided.

III. Methodology and Data

A. Estimation Technique

The coefficient estimates reported in the next section are from regressions using pooled cross-section and time-series data. The general model used can be written

$$(1)\quad Y_{it} = \sum_{k=1}^{K} \beta_k X_{itk} + \varepsilon_{it}, \qquad \begin{matrix}(i = 1, 2, \ldots, N)\\ (t = 1, 2, \ldots, T)\end{matrix}$$

where i denotes markets, t denotes time periods, and $X_{it,1} = 1$ for all i, t. Although it is assumed that

$$(2)\quad E(\varepsilon_{it}\, \varepsilon_{jt}) = 0, \quad (i \neq j)$$

(i.e., cross-section residuals are independent), the time-series residuals may be serially correlated; thus

$$(3)\quad \varepsilon_{it} = \rho_i \varepsilon_{i,\, t-1} + \mu_{it}.$$

Moreover, the residuals are assumed to be heteroskedastic across markets due to the use of a measure of market structure as a dependent variable; thus

$$(4)\quad E(\varepsilon_{it}^2) = \sigma_i^2.$$

Although the Herfindahl Index is a continuous variable, it varies from 1/n to 1 with some clustering at the upper limiting value of one which means expression (4) is not independent of

$E(Y_{it})$, as would be the case when the residual variances are constant.[8/]

Both serially correlated and heteroskedastic residuals result in ordinary least squares (OLS) estimates of the β_k that are unbiased and consistent, but that are not efficient; however, OLS estimates of the variances of the coefficients are biased. This means the calculated confidence intervals will be wider or narrower than the true intervals, which can result in the investigator drawing incorrect conclusions regarding hypothesis tests concerning the $\hat{\beta}_K$. The Durbin-Watson and Goldfeld-Quandt test results for OLS estimates of a number of alternative specifications of the general model indicate that the presence of both serial correlation and heteroskedasticity can not be rejected.

In order to deal with these problems, a double transformation of the pooled data suggested by Kmenta [19, pp. 509-512] was estimated with OLS. This procedure, which is almost equivalent to the generalized least squares procedure (GLS), consists of first applying OLS to all NxT original observations and obtaining the residuals e_{it} to estimate [9/]

$$(5) \quad \hat{\rho} = \sum_i \sum_t e_{it} e_{i,t-1} / \sum_i \sum_t e_{it}^2, \quad \begin{matrix}(i = 1, 2, \ldots, N) \\ (t = 2, 3, \ldots, T)\end{matrix}$$

and then using the $\hat{\rho}$. to transform the original data by forming

$$(6) \quad Y_{it}^* = \sum_{k=1}^{K} \beta_k X_{itk}^* + \mu_{it}^*,$$

where

$$Y^{*}_{it} \equiv Y_{it} - \hat{\rho}\, Y_{i,t-1} \qquad (i = 1, 2, \ldots, N)$$

$$X^{*}_{itk} \equiv X_{itk} - \hat{\rho}\, X_{itk} \qquad (t = 2, 3, \ldots, T)$$
$$(k = 1, 2, \ldots, K)$$

$$\mu^{*}_{it} \equiv \epsilon_{it} - \hat{\rho}\, \epsilon_{i,t-1}.$$

The second stage involves dividing all of the ρ-transformed observations by an estimate of σ_i, where

$$(7) \quad \hat{\sigma}_i^2 = S^2_{\mu i} = \frac{1}{T-K-1} \sum_{t=2}^{T} \hat{\mu}^{*2}_{it}.$$

OLS is then used to estimate

$$(8) \quad Y^{**}_{it} = \sum_{k=1}^{K} \beta_k X^{**}_{itk} + \mu^{**}_{it},$$

where

$$Y^{**}_{it} \equiv \frac{Y^{*}_{it}}{S_{\mu i}}$$

$$X^{**}_{itk} \equiv \frac{X^{*}_{itk}}{S_{\mu i}} \qquad (i = 1, 2, \ldots, N)$$
$$(t = 2, 3, \ldots, T)$$
$$(k = 1, 2, \ldots, K)$$

$$\mu^{**}_{it} \equiv \frac{\mu^{*}_{it}}{S_{\mu i}}$$

using all N(T-1) observations.

B. Delineation of Banking Markets

This study examines the structure of county markets for commercial bank deposits in Alabama for the years 1971-1978. The use of county boundaries to delineate the local banking market, although it has some limitations, appears to be consistent with the choice of deposits as a measure of localized bank output or services. Although the Federal

Reserve Bank of Atlanta has designated only 32 local markets in Alabama for regulatory purposes, 26 of them follow county boundaries; unfortunately, not all of the state's banks have been assigned to a market since such determinations are generally made on a case-by-case basis as applications for charters, mergers, or MHC acquisitions are filed. In the same vein, Gilbert [6] found that counties often appear to be the relevant markets for bank management decisions regarding expansion and market entry through acquisition.

Data availability also dictates the use of counties as local markets. Cross-county branching has been prohibited in Alabama since 1911, but a grandfather clause allowed the one bank then having multicounty branches to retain them. This restriction on branching reduces the possibility of markets extending beyond county boundaries.[10/] Moreover, most of the explanatory variables that characterize local markets are also available only at the county level within the state and on an annual basis.

Finally, the use of county data will allow the results of this study to be compared with several other investigations into the structure and performance of county banking markets in this state.[11/]

C. Market Characteristics

The first MHC was formed in Alabama in 1970; thus, 1971 was the first full year of MHC activity in the state.[12/] The number of MHC affiliates grew from seven to 62 during the period of this study (1971-1978) and reached a total of 70 by

1979. The number of affiliates in each MHC market ranges from two to six, and the seven MHC organizations in existence by the end of 1978 had from two to fifteen affiliates including the lead bank. The sample used in this study consists of 54 markets, 21 of which had at least one of the total of 41 sample MHC affiliates by 1978.[13/] There also were 26 de novo entries during the sample period. Concentration declined in both MHC and non-MHC markets as a group over the period, although statewide concentration increased due to MHC activity. Other characteristics of the sample markets are given in Table 1.

D. Measure of Market Structure

The dependent variable in this study is the level of commercial bank deposit concentration in the local market. The measure of structure used is the Herfindahl Index, which can be written for the ith market as

$$HI_i \equiv \sum_{j=1}^{m} P_j^2,$$

where P_j is the percentage of the ith market's total deposits controlled by the jth bank and m is the number of banks in the market. HI takes on a value of one when there is only one bank and approaches zero as the number of banks increases. Thus, the lower the value of HI, the less concentrated and, by implication, the more competitive is the market.

This measure was chosen because it captures the effects of both changes in the number of firms and changes in the distribution of deposits among existing banks; moreover, it

TABLE 1.

CHARACTERISTICS OF SAMPLE BANKING MARKETS, 1971-1978

Number of markets	54
Number of MHC markets (1978)	21
Number of markets with de novo entry (1971-78)	19
Number of MHC affiliates (1978)	41
Number of new banks (1971-78)	26
Average income (millions of $)	
all markets	234
MHC markets	544
Average per capita income (thousands of $)	
all markets	3,831
MHC markets	4,412
Average employment	
all markets	19,414
MHC markets	41,800
Average population	
all markets	50,897
MHC markets	105,395
Average population density	
all markets	59.6
MHC markets	110.8
Average structure (Herfindahl Index)	
all markets	.390
MHC markets	.342
non-MHC markets	.410
Average change in structure (1971-1978)	
all markets	-.0023
MHC markets	-.0047
non-MHC markets	-.0011

reflects the presence of small banks in the market. The last characteristic is particularly important for this study if, as Weiss [35] has found, the relatively small bank in a market is generally the first to initiate innovative services and if MHC's tend to acquire the smaller banks in local markets. The use of the traditional three- or four-bank concentration ratio could obscure or understate the procompetitive activity resulting from MHC acquisitions of smaller banks and the competitive response of all other banks in the market.

E. Determinants of Market Structure

The explanatory variables used in this study are described in Table 2. In addition to the MHC acquisition effect (X_1 or X_2) discussed earlier, and the obvious effect expected of de novo bank entry (X_3), various measures of local market characteristics thought to be associated with market structure were utilized.

Population, income, and employment, which were assumed to capture the level of demand for banking services or economic market size, were expected to be associated with more banks and, therefore, with more competition and less concentration in the absence of signficant scale economies and assuming equal population distribution. Alternative measures of demand tested were per capita income and the ratio of employment to market population. These may also reflect the extent of economic development and sophistication and, therefore, the demand for a wider array of banking services in a market.

TABLE 2.

DEFINITION OF VARIABLES

Y	= Deposit concentration measure of market structure (HI)
X_1	= Number of MHC affiliates in market (NMHC)
X_2	= 1 if any bank in market is an MHC affiliate (MHC) = 0 is not
X_3	= 1 if de novo entry occurred in market (NB) = 0 if not
X_4	= Population (POP)
X_5	= Income (INC)
X_6	= Employment (EMP)
X_7	= Per capita income (PCAP)
X_8	= Employment/population (EMPR)
X_9	= Square miles (SM)
X_{10}	= Population per square mile (DEN)
X_{11}	= Population per bank (POPB)
X_{12}	= Income per bank (INCB)
X_{13}	= Population density per bank (DENB)
X_{14}	= Per capita income per bank (PCAPB)

The market area in square miles was employed as a measure of transportation and information costs, which were also expected to result in more banks and banking offices, giving rise to less concentration. Population density, on the other hand, could be positively associated with concentration if the population is clustered at one or more points and if there are scale economies because the same number of customers could be served by fewer banks or banking offices. For these reasons, population (or income) per bank, population per square mile, and square miles per bank could be determinants of concentration, given the extent to which scale economies exist.[14/]

Although Shepherd [31, ch. 11] suggests scale economies, technical change, and public policy as possible structure determinants, they are less likely to explain differences among local markets within the same industry. The effects of these factors may be captured in part by the organizational form variables since both the cross-county branching prohibition and the high barriers to local market de novo entry are incentives for MHC acquisitions; moreover, to the extent technical change and innovation occurs, it may be initiated by the newly acquired MHC affiliate.

A previous study found that scale economies are not extensive for either MHC affiliates or independent banks as a group.[15/] Although the former tend to exhibit a larger minimum cost level of output than the latter, the minimum average cost is higher for MHC banks. On the other hand,

although banks in both groups had improvements in operational and technical efficiency over time, MHC banks and independents facing MHC affiliate competition had greater gains in efficiency. Of course, the way entry is regulated may offset the effects of scale economies by protecting relatively inefficient banks.

In summary, the expected relationships are:

$$\frac{\partial Y}{\partial X_k} < 0 \ (k = 1, 2, \ldots, 9); \frac{\partial Y}{\partial X_h} > 0 \ (h = 10, \ldots, 14)$$

IV. Empirical Results

The results reported in Tables 3 and 4 are representative of estimates of a number of alternative specifications of the general model of local market structure that were investigated. The variable names are explained in Table 2.

The instability of the estimates of the income coefficient (INC) across models 3.1-3.4 in Table 3 may be indicative of the possibility of some multicollinearity among that variable and population and employment. Although this would not be surprising in a given market over time, it was not evident in the matrix of simple correlations of the pooled cross-section and time-series observations. The models in Table 4 were estimated in part in an attempt to retain the independent information each of these variables may contain without incurring the possible collinearity problem. These models also provide indirect tests of the effects of the relative sophistication of banking customers and their

TABLE 3.

GLS ESTIMATES OF POOLED CROSS-SECTION AND TIME-SERIES DATA

	Models						
Variables	3.1	3.2	3.3	3.4	3.5	3.6	3.7
Constant	.45 (27.35)*	.45 (27.33)*	.45 (27.11)*	.45 (27.63)*	.44 (26.91)*	.44 (26.81)*	.44 (26.37)*
MHC	-.022 (3.80)*	-.024 (4.29)*	-.023 (3.99)*	-.022 (3.82)*			
NMHC					-.0077 (2.11)**	-.0081 (2.64)*	-.0099 (2.65)*
NB	.0021 (.39)	.0018 (.34)	.0029 (.55)	.0027 (.52)	.0018 (.35)	.0009 (.17)	.0018 (.34)
POP	5.9×10^{-7} (2.30)*	5.5×10^{-7} (3.46)*		3.3×10^{-7} (3.27)*	2.5×10^{-7} (2.59)*	5×10^{-7} (3.58)*	
INC	2.14×10^{-11} (1.30)		-1.3×10^{-11} (.78)	-2.7×10^{-11} (1.82)***	-1.7×10^{-11} (1.09)		1.9×10^{-12} (.19)
EMP	-3.6×10^{-5} (2.24)**	-9.3×10^{-7} (2.42)**	5.2×10^{-7} (1.93)***			-8.3×10^{-7} (2.49)**	2.8×10^{-7} (1.17)
SM	-.00018 (9.44)*	-.00018 (9.31)*	-.00018 (8.81)*	-.00018 (9.31)*	-.00017 (8.61)*	-.00017 (8.86)*	-.00016 (8.10)*
$\bar{R}^2$	.554	.553	.555	.569	.558	.542	.541
F	87.62*	104.94*	106.14*	112.35*	107.25*	100.54*	100.22*

Note: Values in parentheses are t-statistics. Significance at the 1%, 5% and 10% levels are denoted by *, **, and ***, respectively.

geographic distribution on market structure as well as aiding in the sorting out of the interrelationships among scale economies, population distribution, and market size discussed in Section III-E.

The multibank holding company variables (MHC and NMHC), which are the primary concern of this paper, exhibit coefficient estimates that are quite robust across model specifiations and have the expected negative sign in each case, as can be seen in both tables. Thus, the hypothesis that acquisitions by MHC's have resulted in less market concentration in local markets is supported by the data.

The negative signs for total and per capita income suggest those variables affect structure by increasing the number of banks and by reducing the inequality of the distribution of deposits among them, as hypothesized. On the other hand, the population and, perhaps, the employment coefficients appear to be consistent with the hypothesis that unequally distributed, large populations result in more concentration to the extent scale economies exist in banking. This is also borne out by the positive coefficients on population density, income, and population per bank in Table 4. The measure of transportation costs (square miles) has the expected effect on the number of banks in a market.

De novo entry (NB) did not have any significant procompetitive effect on structure over this period despite the fact that entry, by definition, increases the number of banks and should have some effect on the distribution of deposits.

TABLE 4.

GLS ESTIMATES OF ALTERNATIVE SPECIFICATIONS OF POOLED MODEL

	Models				
Variables	4.1	4.2	4.3	4.4	4.5
Constant	.48 (8.96)*	.41 (21.81)*	.31 (29.46)*	.38 (22.08)*	.21 (6.51)*
MHC	-.016 (2.13)*		-.018 (3.37)*	-.022 (3.57)*	-.032 (6.51)*
NMHC		.00059 (.17)			
NB	.0011 (.15)	.00012 (.02)	.0061 (1.21)	.10 (1.85)***	.037 (1.93)***
PCAP	-9.6×10^{-6} (3.85)*	-1.4×10^{-5} (6.47)*		-1.3×10^{-5} (7.57)*	
EMPR	.408 (8.06)*	-1.69 (1.64)***		-2.31 (2.12)**	-.35 (4.31)*
DEN	.00011 (1.96)**	1.9×10^{-6} (.04)			
INCB			-7.6×10^{-10} (6.38)*		
POPB			1.3×10^{-5} (7.16)*		
PCAPB					2.4×10^{-4} (39.06)*
DENB				.0052 (11.36)*	.0029 (5.25)*
$\bar{R}^2$	.432	.467	.621	.604	.743
F	64.72	74.53	175.32	129.70	245.35

NOTE: Values in parentheses are t-statistics. Significance at the 1%, 5%, and 10% levels are denoted by *, **, and ***, respectively.

Similar findings for county markets in the U.S. as a group over time have been reported by Alhadeff and Alhadeff [1], who attribute this to high entry barriers. This, plus the advantages to the MHC of acquisition relative to de novo entry, suggests that the former has had a greater effect on structure via promoting competitive activity than has the entry of new firms in these markets.[16/]

V. Conclusions and Implications

The results of this investigation generally confirm the hypothesis that MHC entry into local banking markets via acquisition has led to increased competition and more equal deposit distributions as measured by the market structure variable. This procompetitive effect was significant when the effects of de novo bank entry and other structure determinants were taken into account. De novo entry itself did not have a significant procompetitive effect. These findings have important implications for both intra- and interstate banking.

First, they affirm the expectations of the Board regarding the potential procompetitive effects on local markets of MHC entry via acquisition. Thus the Board, in its implementation of the benefits test, should continue its practice of approving MHC applications when there is no clear potential for increased local market concentration.[17/] Moreover, these findings support those who argue for the repeal of state legislation that prohibits or limits MHC activity in local markets.

Second, the results of this study support arguments regarding the procompetitive effects of more liberalized legislation and regulation of interstate banking. In view of its procompetitive effects on local markets, plus the apparent negligible effects of de novo entry in the past, MHC acquisitions should be permitted as a means of "opening up" banking markets on a nationwide basis. In addition to the local market public benefits of acquisitions, interstate MHC activity would counter the presumed (but heretofore undocumented) adverse effects of greater statewide concentration due to intrastate MHC growth.

FOOTNOTES

* The assistance of Marie Coleman and Tom Gregory is gratefully acknowledged. Discussions with a colleague, Dallas Batten, were particularly helpful in our development of the methodology of this study.

1/ Rhoades [26, p. 1] attributes this shift in bank behavior to the stronger position against horizontal mergers taken by Congress and the courts during the early 1960's. He cites the Bank Merger Act of 1960 and United States v. Philadelphia National Bank (374 U.S. 321 (1963)) in particular as reflecting this public policy stance regarding monopoly in local markets.

2/ See Kohn and Zoellner [18] for a discussion of this legislation.

3/ The McFadden Act bars interstate branching except for cases in which a state has legislation expressly permitting branches of out-of-state banks. The "Douglas Amendment," which refers to Section 3(d) of the Bank Holding Company Act, extends this restriction to holding company acquisitions across state lines. See Shay [30] for a discussion of these laws and their interpretation. An Administration Task Force report recently recommended some relaxation of the present restrictions on interstate banking.

4/ Section 3 of the Bank Holding Company Act of 1956. See Jessee and Seelig [17] for an evaluation of the Board's implementation of this test in the past.

5/ This study does not deal with the issue of statewide concentration. For theoretical and empirical treatment of this issue see Rhoades [25] and [26], Heggestad and Rhoades [13], and Rose [28].

6/ This survey treats only the market studies. For the literature on MHC effects on individual bank performance, see Graddy [9] and the articles therein.

7/ Useful discussions of the issues and evaluations of previous studies can be found in Graddy [9], Bowsher [4], Rhoades [24], Glassman and Eisenbeis [7] and Drum [5].

8/ See Kmenta [19, pp. 425-28]. The Herfindahl Index is described in subsection D below.

9/ This procedure differs from the true GLS approach only in that the first observation is lost in transforming the data. The procedure used will be referred to as GLS in the remainder of the paper. Note, too, that Kmenta wrote expression (5) as

$$(5') \quad \hat{\rho}_i = \sum_t e_{it} e_{i,t-1} / \sum_t e^2_{i,t-1}. \quad (t = 2, 3, \ldots, T)$$

Unfortunately, the pooled sample contained only eight time-series observations for each market, which did not allow us to obtain residuals; thus, we were forced to assume the $\hat{\rho}_i$ were the same across markets.

10/ If the use of counties as markets systematically understates the relevant market size, the structure measure could have an upward bias; on the other hand, it may have a downward bias if the banks are not truly independent (e.g., the case of chain banking).

11/ These include Martell and Hooks [22], Hooks and Martell [15] and [16], and Guttentag and Thomas [10].

12/ For an overview of the MHC movement in Alabama, see Martell [21].

13/ Because all deposits of the one bank that had been allowed to retain its multicounty branching system under the grandfather clause were reported for the county in which the home office was located, we were forced to drop thirteen markets from the sample.

14/ See Ali and Greenbaum [2] and Benson [3] for the relationships among observed market concentration, population density and distribution, and scale economies. Benson suggests that attempts to link concentration and market performance (competitiveness) should account for factors such as population density per bank.

15/ See Martell and Hooks [22].

16/ The significant positive coefficient on the de novo entry variable in Models 4.4 and 4.5 is puzzling; no economic explanation is offered here.

17/ Such potential anticompetitive situations as MHC acquisition of the largest bank in a concentrated market or multiple affiliates of the same MHC in a market come to mind.

REFERENCES

1. Alhadeff, David A., and Charlotte P. Alhadeff, "Bank Entry and Bank Concentration," Antitrust Bulletin (Fall 1975), pp. 471-83.

2. Ali, Mukhtar, and Stuart Greenbaum, "A Spatial Model of the Banking Industry," Journal of Finance (September 1971), pp. 1283-1303.

3. Benson, Bruce, "Spatial Microeconomics: Implications for the Relationship Between Concentration of Ownership and Bank Performance," Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago (October 1980), pp. 60-85.

4. Bowsher, Norman N. "Have Multibank Holding Companies Affected Commercial Bank Performance?", Review, Federal Reserve Bank of St. Louis (April 1978), pp. 8-15.

5. Drum, Dale S., "MBHC's: Evidence after Two Decades of Regulation," Business Conditions, Federal Reserve Bank of Chicago (December 1976), pp. 3-15.

6. Gilbert, Gary G., "An Analysis of Federal Regulatory Decisions on Market Extension Bank Mergers," Journal of Money, Credit and Banking (February 1975), pp. 81-92.

7. Glassman, Cynthia A., and Robert A. Eisenbeis, "Bank Holding Companies and Concentration of Banking and Financial Resources," in The Bank Holding Company Movement to 1978: A Compendium, Staff Study, Board of Governors of the Federal Reserve System (September 1978), pp. 209-61.

8. Goldberg, Lawrence G., "Bank Holding Company Acquisitions and Their Impacts on Market Shares," Journal of Money, Credit and Banking (February 1976), pp. 45-53.

9. Graddy, Duane B., The Bank Holding Company Performance Controversy (Washington, D.C.: University Press of America, 1979).

10. Guttentag, Jack M., and Kenneth H. Thomas, "Branch Banking and Bank Structure: Some Evidence from Alabama," Journal of Bank Research (Spring 1979), pp. 45-53.

11. Heggestad, Arnold A., and Stephen A. Rhoades, "An Analysis of Changes in Bank Market Structure," Atlantic Economic Journal (Fall 1976), pp. 64-69.

12. _____, "Concentration and Firm Stability in Commercial Banking, Review of Economics and Statistics (November 1976), pp. 443-52.

13. _____, "Multimarket Interdependence and Local Market Competition in Banking," Review of Economics and Statistics (November 1978), pp. 523-32.

14. Hoffman, Stuart G., The Impact of Holding Company Affiliation on Bank Performance: A Case Study of Two Florida Multibank Holding Companies. Working Paper Series, Federal Reserve Bank of Atlanta (1976).

15. Hooks, Donald L., and Terrence F. Martell, "Effects of the Multibank Holding Companies on Local Market Concentration," Journal of the Midwest Finance Association (September 1979), pp. 57-70.

16. _____, "The Impact of Multibank Holding Company Acquisitions on Local Market Structure, Working Paper, University of Alabama (August 1980).

17. Jessee, Michael A., and Steven A. Seelig, "An Analysis of the Public Benefits Test of the Bank Holding Company Act," Monthly Review, Federal Reserve Bank of New York (June 1974), pp. 151-62.

18. Kohn, Donald L., and John F. Zoellner, "The Amended Bank Holding Company Act," Monthly Review, Federal Reserve Bank of Kansas City (May 1971), pp. 11-20.

19. Kmenta, Jan, Elements of Econometrics (New York: The Macmillan Company, 1971).

20. Light, Jack S., "Bank Holding Companies-Concentration Levels in three District States," Business Conditions, Federal Reserve Bank of Chicago (June 1975), pp. 10-15.

21. Martell, Terrence F., "The Multibank Holding Company Movement in Alabama," Alabama Business (July/August 1979), pp. 2-12.

22. _____, and Donald L. Hooks, "Holding Company Affiliation and Economies of Scale," Journal of the Midwest Finance Association (1975), pp. 57-71.

23. Rhoades, Stephen A., "The Impact of Foothold Acquisitions on Bank Market Structure," Antitrust Bulletin (Spring 1977), pp. 119-28.

24. _____, "The Effect of Bank Holding Companies on Competition," in The Bank Holding Company Movement to 1978: A Compendium, Staff Study, Board of Governors of the Federal Reserve System (September 1978), pp. 185-207.

25. _____, "Aggregate Concentration: An Emerging Issue in Banking Merger Policy, Antitrust Bulletin (Spring 1979), pp. 1-16.

26. _____, Banking Structure and Performance at the State Level during the 1970's, Staff Study No. 111, Board of Governors of the Federal Reserve System (March 1981).

27. _____, and Roger D. Rutz, Impact of Bank Holding Companies on Competition and Performance in Banking Markets, Staff Study No. 107, Board of Governors of the Federal Reserve System (August 1979).

28. Rose, John T., "Aggregate Concentration in Banking and Political Leverage: A Note," Industrial Organization Review (1978), pp. 193-97.

29. Schweitzer, Paul, and Joshua Greene, Greely in Perspective, Staff Economic Study No. 90, Board of Governors of the Federal Reserve System (1977).

30. Shay, Jerome, W., "Interstate Banking Restrictions of the International Banking and Bank Holding Company Acts," Banking Law Journal (June/July 1980), pp. 524-26.

31. Shepherd, William G., The Economics of Industrial Organization (Englewood Cliffs, New Jersey: Prentice-Hall, 1979).

32. Shull, Bernard, "Multiple-Office Banking and the Structure of Banking Markets: The New York and Virginia Experience," Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, (October 1972), pp. 36-40.

33. Talley, Samuel H., Recent Trends in Local Banking Market Structure, Staff Economic Study No. 89, Board of Governors of the Federal Reserve System (1977).

34. Ware, Robert F., "Bank Concentration in Ohio," Economic Commentary, Federal Reserve Bank of Cleveland (November 24, 1975).

35. Weiss, Stephen J., "Commercial Bank Price Competition: The Case for 'Free Checking Accounts," New England Economic Review, Federal Reserve Bank of Boston (September/October 1969), pp. 3-22.

36. Whitehead, David D., and B. Frank King, "Multibank Holding Companies and Local Market Concentration," Monthly Review, Federal Reserve Bank of Atlanta (April 1976), pp. 34-43.